

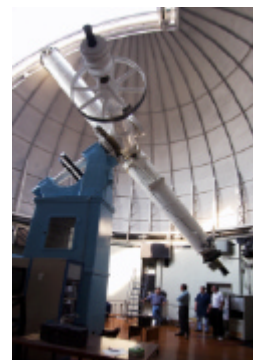
NAVAL METEOROLOGY AND OCEANOGRAPHY PRECISE TIME AND ASTROMETRY

PROVIDING AN ASYMMETRIC WARFIGHTING ADVANTAGE



Precise Time and Astrometry: The U.S. Navy and Department of Defense require precise time and astrometry for communications, weapons targeting, and precision navigation. The United States Naval Observatory (USNO) is the sole provider to the defense community of this information, which is vital to modern warfare. Key support areas are:

- **Time.** USNO is the official source of time for the Department of Defense and Navy. It determines, maintains, and disseminates precise time and time interval reference values, ensures uniformity, provides timing data for navigation, precise positioning and C3, and maintains the Master Clock. An active research program to develop even more precise clock systems ensures that USNO will be able to continue to meet the most stringent timing requirements.
- **Astrometry.** USNO is a world-recognized leader in astrometry. The Astrometry Department determines fundamental positions, motions and distances of celestial objects and ascertains the real-time relative positions of these objects to establish reference frames in the sky. Astrometry is required by the Navy and the Department of Defense for navigation systems, precise positioning, and communications.
- **Earth Orientation.** USNO provides real-time data about the Earth's orientation and rotation, which are necessary for a variety of high-precision applications, both military and civilian. Earth orientation and rotation parameters impact navigation, precise positioning, astronomy, geodesy, communications, and time-keeping.



Impact on warfighter operations:

- Precise timing and Earth orientation parameters are key enablers for precision strike. Accurate and precise parameters are necessary for the Global Positioning System (GPS), which is used for navigation and weapons systems guidance.
- Precise atomic clocks are used as a time standard for satellites and other communications platforms.
- Precise timing is required for communications in network-centric warfare ensuring interoperability of warfighter support systems, such as tactical data links, Global Information Grid (GIG), FORCEnet synchronization, ISR Battle management, and other C4I systems.
- Astrometry is used as reference for guidance systems and to navigate and orient space-based platforms.
- USNO astronomical catalogs and expertise are used by the defense, scientific, commercial, and civilian communities.



For more information: Superintendent, U.S. Naval Observatory, and Director of Oceanography Operations for Precise Time and Astrometry, 202-762-1538.